

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
Supratik Guha et al.)
Serial No.: 10/699,399)
Group Art Unit: 2859)
Filed: October 30, 2003)
Examiner: Mirellys Jagan)
For: TRANSPARENT COOLING DUCT)
_____)

Board of Patent Appeals and Interferences
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

APPELLANT'S REPLY BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Examiner's Answer dated October 1, 2009, the two month due date for response to which is December 1, 2009, Appellant hereby respectfully submits this reply brief in support of the Appellant's appeal to the Board of Patent Appeals and Interferences of the Examiner's final rejection of claims 3, 4, 7, 9, 10, 15, 16, 19, 21, 22, 29, and 30 of the above-referenced application.

CERTIFICATE OF TRANSMISSION

In accordance with 37 CFR 1.8, I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted or submitted under electronics filing system to the U.S. Patent and Trademark Office on the date:

December 1, 2009

By: Jon A. Gibbons

Signature: /Jon A. Gibbons/

(Applicant, Assignee, or Representative)

RESPONSE TO EXAMINER'S ANSWER

THE INDEPENDENT CLAIMS ARE PATENTABLE OVER DAVIDSON AND PANICCIA

The Examiner has taken the position that independent claims 7 and 19 (and their dependent claims 3-4, 9-10, 15-16, 21-22, and 29-30, respectively) are unpatentable over *Davidson* (U.S. Patent No. 6,140,141) in view of *Paniccia* (U.S. Patent No. 6,251,706). In response, the Appellant respectfully traverses this rejection, and submits that *Davidson* and *Pannicia* alone and/or in combination with each other do not teach or suggest all the elements and limitations of the claimed invention. Consequently, the claims on file are not taught or suggested by *Davidson* and *Pannicia* alone and/or in combination with each other, and the allowance of these claims is earnestly solicited.

In the “Response to Argument” Section of the Examiner’s Answer, the Examiner states, on page 11, that:

Appellant's arguments that there is no reason to combine Davidson with Paniccia because Davidson is not directed to measuring thermal distributions of chips (pages 8-9), and because Paniccia does not show or suggest a window that is part of a cooling system that uses coolant flowing through a duct so as to cool an electronic device (page 8-10) and a duct with coolant flowing through it (page 9) are not persuasive because one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Davidson is not relied upon in the rejections for teaching measuring thermal distributions, and Paniccia is not relied upon in the rejections for teaching a cooling system that uses coolant flowing through a duct.

The Appellant respectfully disagrees with the Examiner. The Appellant was not attacking the references individually, but was in fact explaining how the teachings of each of the *Davidson* and *Paniccia* references do not foster any suggestion or motivation to combine these references. To show that the references fail to teach, suggest, or comprise any motivation to combine each other, one needs to discuss the individual teachings of there references separately.

Furthermore, the United States Supreme Court recently issued an opinion regarding the issue of obviousness under 35 USC §103(a) when the claim recites a combination of elements of the prior art. See KSR Int'l Co. v. Teleflex, Inc. No. 04-1350 (U.S. Apr. 30, 2007)¹.

In *KSR Int'l*, the Court reaffirmed the *Graham*² factors in determining obviousness under 35 U.S.C §103(a). The four factual inquiries under *Graham* are:

- 1) determining the scope and contents of the prior art;
- 2) ascertaining the differences between the prior art and the claims in issue;
- 3) resolving the level of ordinary skill in the pertinent art; and
- 4) evaluating evidence of secondary consideration.

The Supreme Court did not totally reject the use of “teaching, suggestion, or motivation” as a factor in the obviousness analysis. Rather, the Court recognized that a showing of “teaching, suggestion, or motivation” to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 USC §103(a). The Court rejected a rigid application of the “teaching, suggestion, or motivation” test which required a showing of some teaching, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the prior art elements in the manner claimed in the application or patent before holding the claimed subject matter to be obvious. The Court noted that the analysis supporting a rejection under 35 USC §103(a) should be made explicit and that it was important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements in the manner claimed. The Court stated:

Often, it will be necessary ... to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was **an apparent reason** to combine the

¹ See, <http://www.supremecourtus.gov/opinions/06pdf/04-1350.pdf>

² *Graham v. John Deere*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966)

known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit.** (emphasis added)
KSR Int'l, slip op. at 14 (emphasis added).

Thus, in formulating an obviousness rejection under 35 USC §103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.

The Examiner's reason, as stated on page 4 of the December 4, 2007 Final Office Action, is given as: “By replacing the window with a window as taught by Paniccia, in order to provide a window having a desired thermal conductivity to remove heat depending on the heat removal requirements of a particular application, and since the particular type of material used to make the window is only considered to be the use of a “preferred” or “optimum” material out of a plurality of well know materials that a person having ordinary skill in the art at the time the invention was made would have been able to provide based on intended use of applicant’s apparatus, i.e., suitability for the intended use of applicant’s apparatus, which in this case is to provide a window that is partially transparent to photons with wavelengths above 3.6 microns, as taught by Davidson and Paniccia.”

The Examiner asserts that a selection of a material on the basis of suitability for intended use of an apparatus would be entirely obvious. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

Appellant respectfully asserts that there is no teaching, suggestion, or motivation to combine these references.

Davidson is not directed towards a device for measuring thermal distributions of chips but for sensing voltages of signals on a die. (*Davidson*, col. 3, lines 41-42) **In *Davidson*, the voltages are not measured by sensing infrared radiation but by sensing a polarization of light reflected back from the device (Col. 1, lines 25-29) or by measuring the intensity of near-infrared radiation (Col. 2, lines 58-60) emitted from the circuit. Near-infrared radiation has a defined**

range of wavelengths between 0.75 and 2.5 microns. *Davidson* clearly states in col. 5, lines 60-61 “...substantially transparent to near-infrared radiation”. *Davidson* only teaches near-infrared radiation. *Davidson*’s teaching of “i.e., radiation having wavelengths about 1 μ m” is directed to describing near-infrared radiation, which as discussed above, has a defined range of wavelengths between 0.75 and 2.5 microns. Therefore, *Davidson* can only teach wavelengths between 0.75 and 2.5 microns. See the 37 C.F.R. §1.132 submitted in the Appellant’s Appeal Brief and the printouts of three (3) websites providing data on wavelength transmissions through BK7 glass and fused quartz.

Davidson discloses two materials that are used for the window: fused quartz, and BK-7 glass. (*Davidson*, col. 3, lines 1-2), **which are only substantially transparent to near-infrared radiation and not the IR frequency range.** *Paniccia* discloses a window material that is transparent to **IR wavelengths**. Also, *Paniccia* does not teach nor suggest that the window is part of a cooling system that uses coolant flowing through a channel so as to cool an electronic device, **as required by *Davidson*.**

Davidson does not operate in the IR frequency range, but instead operates in the **near-infrared radiation range**. (*Davidson*, col. 2, line 59). The two materials specifically called out by *Davidson*, namely fused quartz and BK-7 glass, are sufficient for the near-infrared radiation range that *Davidson* operates in. (*Davidson*, col. 4, lines 1 and 2). **Thus, one would have no motivation to take the IR transparent window material from *Paniccia*, a reference that does not even pertain to liquid cooling, and use it in place of the upper window of a cooling duct in *Davidson*, which is only transparent in the near-infrared range.**

In addition, *Davidson* is not concerned with generating a thermal distribution. In *Davidson*, the voltages are not measured by sensing infrared radiation, but by sensing a polarization of light reflected back from the device (Col. 1, lines 25-29) or by measuring the intensity of near-infrared radiation (Col. 2, lines 58-60) emitted from the circuit. **In contrast, *Paniccia* teaches that voltage is determined by measuring a phase shift between laser beams.**

Davidson does not disclose a duct that is at least partially transparent to photons with wavelengths above 3.6 microns and made of at least one of polished silicon, quartz, sapphire, glass, and diamond.

As discussed above, *Davidson* only teaches near-infrared radiation and the teaching of “i.e., radiation having wavelengths about 1 μ m” should be limited to a range of wavelengths between 0.75 and 2.5 microns, which is the defined range for near-infrared wavelengths.

In addition, *Paniccia* doesn't have, teach, or suggest a duct with coolant flowing through it, as recited in the independent claims of the instant application.

Therefore, in view of the remarks and arguments above, one of ordinary skill would not be motivated to combine *Paniccia* with *Davidson* to overcome the deficiencies of *Davidson*.

Further, when there is no suggestion or teaching in the prior art, the suggestion or motivation cannot come from the Applicant's specification. The Federal Circuit has warned against using the Applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teachings of the prior art. See MPEP §2143 and Grain Processing Corp. v. American Maize-Products, 840 F.2d 902, 907, 5 USPQ2d 1788 1792 (Fed. Cir. 1988) and In re Fitch, 972 F.2d 160, 12 USPQ2d 1780, 1783-84 (Fed. Cir. 1992).

The Examiner further states in the “Response to Argument” Section of the Examiner's Answer, the Examiner states, on page 12, that:

Appellant's arguments (page 9) that there is no reason to take the IR transparent window material from *Paniccia* and exchange it for the upper window of a cooling duct in *Davidson*, or modify *Paniccia* in view of *Davidson*, are not persuasive because the rejections are not based on replacing the material of the *Paniccia* window with the material of the *Davidson* window. Instead, the rejections are based on replacing the material of *Davidson*'s window with a material as taught by *Paniccia*, i.e., modifying *Davidson* in view of *Paniccia*.

The Examiner seems to be misinterpreting the Appellant's arguments. For example, the Appellant argued on page 9 of the Appellant's Appeal Brief that:

... Thus, one would have no motivation to take the IR transparent window material from *Paniccia*, a reference that does not even pertain to liquid cooling, and exchange it for the upper window of a cooling duct in *Davidson*...

As can be seen, the argument of “Thus, one would have no motivation to take the IR transparent window material from *Paniccia*, a reference that does not even pertain to liquid cooling, and exchange it for the upper window of a cooling duct in *Davidson*” is not modifying *Paniccia* in view of *Davidson*, as asserted by the Examiner. The phrase “and exchange it for the upper window of a cooling duct in *Davidson*” means replacing the upper window of a cooling duct in *Davidson* with the IR transparent window material from *Paniccia* and not vice versa as asserted by the Examiner.

As discussed above, *Davidson* does not operate in the IR frequency range. (*Davidson*, col. 2, line 59). ***Davidson* only teaches near-infrared radiation. *Davidson*'s teaching of “i.e., radiation having wavelengths about 1 μ m” is directed to describing near-infrared radiation, which as discussed above, has a defined range of wavelengths between 0.75 and 2.5 microns. The two materials specifically called out by *Davidson*, namely fused quartz and BK-7 glass, **are only substantially transparent to near-infrared radiation, as taught by Davidson, and not the IR frequency range, as taught by Paniccia**. Thus, one would have no motivation to use the IR transparent window material from *Paniccia*, a reference that does not even pertain to liquid cooling, in place of the upper window of a cooling duct in *Davidson*. In addition, *Davidson* is not concerned with generating a thermal distribution.**

The prior art reference *Davidson* taken alone and/or in view of *Paniccia* does not suggest, teach or mention “a duct adapted to be coupled with an electronic device, wherein the electronic device forms one side of the duct; a coolant flowing through the duct so as to cool the electronic device; and a photon detector located adjacent to the duct for detecting photons emitted from the electronic device, wherein the duct and the coolant are at least partially transparent to photons with wavelengths above

3.6 microns and the duct is made of at least one of polished silicon, quartz, sapphire, glass, and diamond,” as recited in independent claim 7 of the instant application.

In fact, *Davidson* and *Paniccia* teach away from the presently claimed “a duct adapted to be coupled with an electronic device, wherein the electronic device forms one side of the duct”. For example, the Examiner seems to be comparing the window of *Davidson* with the presently claimed “duct”. However, *Davidson* teach that the window is positioned over the die and that a channel is between the window and a die. Therefore, it is impossible for the die of *Davidson* to form one side of the window. *Paniccia* explicitly teaches at col. 5, lines 18-37 that the heat slug contacts the device. In other words, it is impossible for the heat slug in *Paniccia* to be a duct with a coolant flowing through the duct so as to cool the electronic device, as recited for the presently claimed invention. Therefore, *Davidson* and *Paniccia* alone and/or in combination with each other fail to teach or suggest “a duct adapted to be coupled with an electronic device, wherein the electronic device forms one side of the duct; a coolant flowing through the duct so as to cool the electronic device”.

The prior art reference *Davidson* taken alone and/or in view of *Paniccia* also does not suggest, teach or mention “detecting, by a photon-detector, photons from an electronic device during operation of the electronic device, the photons indicative of thermal characteristics of the electronic device, the photon detector located adjacent to a duct that is adjacent to the electronic device, wherein the electronic device forms one side of the duct and a coolant flows through the duct so as to cool the electronic device and the duct and the coolant are at least partially transparent to photons with wavelengths above 3.6 microns and the duct is made of at least one of polished silicon, quartz, sapphire, glass and diamond,” as recited by the presently claimed invention.

Paniccia taken alone and/or in view of *Davidson* does not suggest, teach or mention a duct partially transparent to photons with wavelengths above 3.6 microns and made of at least one of polished silicon, quartz, sapphire, glass and diamond, for the reasons stated above.

The Examiner also states in the “Response to Argument” Section of the Examiner’s Answer, the Examiner states, on page 12, that:

Appellant's arguments (pages 10-11) that the combination of Davidson and Paniccia will render Davidson's device inoperable because Davidson will no longer be able to measure voltages are not persuasive since the Davidson device will still be able to obtain the voltage measurements when modified with Paniccia, as stated in the rejections, since Paniccia's device (page 6) measures both voltage and a thermal distribution of a chip.

The Appellant respectfully disagrees. On page 2 of the June 26, 2006 Office Action, the Examiner states “fused quartz (up to 3.6 microns) or BK7 glass (0.25 to 2.9 microns)” and this is clearly the range claimed in independent claims 1 and 17 of “wavelengths above 3.6 microns”. **By the Examiner's own admission, fused quartz and BK-7 glass are inoperable for the thermal imaging of Appellant's invention above 3.6 microns.** In other words, if one were to take the glass of *Paniccia* and replace it with the glass of *Davidson*, the IR detector of *Paniccia* would no longer function because IR wavelengths cannot pass through fused quartz or BK-7 glass. **During the prosecution history of this case, Appellant amended the independent claims on appeal specifically to include the “above 3.6 microns” limitation because the Examiner indicated that Davidson was inoperable at this level. See page 2 of Office Action dated June 26, 2006.** What is the motivation to combine these two references if the result to one skilled in this art is readily inoperable?

Appellant submitted in the Appellant’s Appeal Brief a Declaration under 37 C.F.R. §1.132 from Dr. Emanuel Tutue, a researcher at IBM who is familiar with infra-red radiation along with the corresponding general wavelength of transmission of two groups of materials: i) fused quartz and B-K glass and ii) polished silicon, quartz, sapphire, glass and diamond. The Declaration of Dr. Tutue supports Appellant's argument that fused quartz and BK-7 glass are inoperable for thermal imaging above 4 microns. Appellant also has included in the Appellant’s Appeal Brief printouts of three (3) websites providing data on wavelength transmissions through BK7 glass and fused quartz.

Since *Davidson* and *Paniccia* produce a clearly inoperable result, one would not be motivated to take the IR transparent window of *Paniccia* and place it in the liquid cooling duct of *Davidson* because the materials recited in *Davidson* for sensing polarization of light work well for their intended use, which is at lower wavelengths. Further, one would not be motivated to take the IR camera of *Paniccia* and use it to replace the polarization sensing device of *Davidson*, simply because *Davidson* would no longer be able to sense voltages through detection of light polarization. Thus, *Davidson* would be inoperable.

The Appellants respectfully disagree with the Examiner's statement of "Davidson device will still be able to obtain the voltage measurements when modified with Paniccia, as stated in the rejections, since Paniccia's device (page 6) measures both voltage and a thermal distribution of a chip" because *Paniccia's* window is for infrared wavelengths while *Davidson* is windows if for near-infrared wavelengths. Also, *Paniccia's* explicitly teaches measuring phase shift for determining voltage while *Davidson* explicitly teaches polarization sensing. Therefore, the combination of *Davidson* and *Paniccia* results in an operable device.

References that produce seemingly inoperative devices cannot serve as predicates for a *prima facie* case of obviousness.

The Examiner further states in the "Response to Argument" Section of the Examiner's Answer, the Examiner states, on page 12, that:

Appellant's arguments (page 11) that there is no reason to take the IR transparent window material from *Paniccia* and exchange it for the upper window of a cooling duct in *Davidson*, or modify *Paniccia* in view of *Davidson*, are not persuasive because the rejections are not based on replacing the material of the *Paniccia* window with the material of the *Davidson* window. Instead, the rejections are based on replacing the material of *Davidson's* window with a material as taught by *Paniccia*, i.e., modifying *Davidson* in view of *Paniccia*.

The remarks and arguments made above, with respect to a similar statement made by the Examiner are applicable here and will not be repeated.

The Examiner also states in the “Response to Argument” Section of the Examiner’s Answer, the Examiner states, on page 12, that:

Appellant's arguments that Davidson measures the intensity of near-IR radiation, and discloses materials (fused quartz and BK7 glass) for the window that are not transparent to wavelengths above 3.6 microns are not persuasive because Davidson states that the materials for the window are transparent to radiation having a wavelength of about 1 micron or more (see column 2, lines 58-61), which includes the wavelength range claimed by Appellant.

As discussed above, **during the prosecution history of this case, Appellant amended the independent claims on appeal specifically to include the “above 3.6 microns” limitation because the Examiner indicated that Davidson was inoperable at this level. See page 2 of Office Action dated June 26, 2006.** Also, **Near-infrared radiation has a defined range of wavelengths between 0.75 and 2.5 microns.** *Davidson* clearly states in col. 5, lines 60-61 “...substantially transparent to **near-infrared radiation**”. *Davidson* only teaches **near-infrared radiation**. *Davidson*’s teaching of “i.e., radiation having wavelengths about 1 μ m” is directed to describing **near-infrared radiation**, which as discussed above, **has a defined range of wavelengths between 0.75 and 2.5 microns.** Therefore, *Davidson* can only teach wavelengths between 0.75 and 2.5 microns. See the 37 C.F.R. §1.132 submitted in the Appellant’s Appeal Brief and the printouts of three (3) websites providing data on wavelength transmissions through BK7 glass and fused quartz.

Accordingly, for the reasons stated above, *Davidson* and *Paniccia* alone and/or in combination with each other do not teach or suggest the presently claimed invention. Also the Appellant respectfully asserts that it was improper to combine *Davidson* in view of *Paniccia* to reject Appellant's application under 35 U.S.C. 103(a). Accordingly, Appellant respectfully requests that the rejection be withdrawn and the Examiner's decision reversed.

For the reasons stated above, the Appellant respectfully contends that each claim is patentable.
Therefore, reversal of all rejections is courteously solicited.

Respectfully submitted,

Dated: December 1, 2009

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